INTERPLANT STANDARD - STEEL INDUSTRY		
IPSS	**GUIDE FOR CENTRAL INSTRUMENTATION AND AUTOMATION LABORATORY**	**IPSS: 2-07-014-13** *(Second Revision)*
	No Corresponding IS	Formerly: IPSS:2-07-014-93 *(First Revision)*

0. FOREWORD

0.1 This Interplant Standard (first revision) was prepared by the Standards Committee on Computerization & Automation, IPSS 2:7, with the active participation of the representatives of all the steel plants, other concerned organizations and established manufacturers of measuring, testing and electronics equipments, and was revised in August 2013.

0.2 This standard was first published in 1988. The second revision has been carried out in August, 2013 to update the standard after reviewing from implementation point of view.

0.3 Interplant standards for steel industry primarily aim at achieving rationalization and unification of parts and sub-assemblies used in steel plants equipment and accessories, and provide guidance in indenting stores for existing or new installations by individual steel plants. For exercising effective control on inventory, it is advisable to select a fewer number of sizes (or types) from among those mentioned in the standards, for the purpose of company standards of individual steel plants. It is not desirable to make deviations in technical requirements.

1. SCOPE

1.1 This Interplant standard covers the equipment requirement of instrumentation and automation laboratory which are primarily meant to carry out repairs, maintenance, testing and calibration of instrumentation, digital and automation systems, development of such systems and for imparting training to personnels.

2. ORGANIZATION OF WORK

The Instrumentation and automation laboratory can be organized in four sections.

2.1 Instrumentation Section – Which houses the equipments and facilities to carry out tests, repairs and calibration of various instrumentation systems.

2.2 Automation Section – Which houses the equipments and facilities to carry out tests and repairs of various digital and automation systems and development of such systems.

2.3 Training and Simulation Facilities – Which include trainers, simulators and training aids.

2.4 Precision Workshop – Which houses the equipments for doing precision mechanical jobs.

3. EQUIPMENTS FOR INSTRUMENTATION AND AUTOMATION LABORATORY

3.1 Common Equipment for Testing. Measurement and Development

3.1.1 Oscilloscope

a) Universal dual trace Oscilloscope, 35 MHz BW and standard facilities

b) Universal dual channel 100 MHz BW Oscilloscope with delay triggering and slope selection facilities, and

c) Digital storage Oscilloscope - 100 MHz BW

3.1.2 Power Supplies

a) Regulated dc power supply 50V, 5A

b) Multiple output regulated power supply 5V, 2A, ±15V, 1A, ±24V, 2A.

c) Precision 4 to 20 mA source with 6 digit display.

3.1.3 Multimeters

a) Auto ranging 3 ½ digit portable digital multimeter

b) Test bench model 4 ½ digit digital multimeter

c) Analog high impedance multimeter, sensitivity 20 K-ohm/volt

d) 6 ½ digit precision multimeter (for calibration)

3.1.4 Digital direct reading LCR meter

3.1.5 Microprocessor based high resolution counter

3.1.6 Portable timer and counter 0-100 MHz

3.1.7 Universal programmable pulse and function generator (0.01 Hz to 100 MHz)

3.1.8 Positive / negative activity logic probe / analyzer, alternator probes, extension probes, current probes and high voltage probes.

3.1.9 Automatic digital IC tester and linear IC tester.

3.1.10 IC tester clip (monitor) for 8 pin to 64 pin.

3.1.11 Three range digital insulation tester.

3.1.12 Digital tacho-meters.

3.1.13 Sound level meters.

3.1.14 AF and RF power meter.

3.1.15 Audio distortion level meter

3.1.16 Decade resistance box 0.01 and 0.1 resolution.

3.1.17 Decade condenser box.

3.1.18 Curve tracer for semiconductor devices.

3.1.19 Power line disturbance analyzer.

3.1.20 Precision resistance box 9999.99 ohm (digital).

3.1.21 Personal Computers with peripherals, standard interfaces (Rs-232, IEEE 488) and available Control Softwares.

3.1.22 2-4 channel chartless recorder having pen frequency response up to 100 Hz.

3.1.23 Facilities for PCB checking.

3.1.24 Electronic tool case.

3.1.25 Microprocessor trouble shooter.

3.1.26 Precision watt meter.

3.1.27 Programmable sweep generator.

3.1.28 ac voltage and frequency stabilizer : single phase and three phase variac.

3.1.29 Soldering iron

a) Temperature controlled (fixed 370^{o}C) soldering iron. Tip insulation 100 M-ohm, Min, low leakage current. Tip sizes 1-3 mm different shapes 15 W, 25 W, power 230 V, 50 Hz.

b) Temperature controlled (adjustable in the range 150°C to 450°C) soldering iron. Tip insulation 100 M-ohm, Min, low leakage current. Tip sizes 1-3 mm different shapes 15 W, 50 W, power 24 V.

c) Cordless soldering iron (rechargeable battery operated)

3.1.30 Desoldering tools

a) Solder sucker

b) Desoldering station – adjustable tip temperature and suction by electric pump

c) Automatic dispensers

d) Emission during soldering shall be within permissible limit.

3.1.31 IC extractor and insertors S-40 pin.

3.1.32 Infra-red detector for thermal detection of defective parts.

3.1.33 Hand tools.

3.1.33.1 Wire cutter.

3.1.33.2 Wire and cable stripper.

3.1.33.3 Pliers (short nose, long nose and bend nose).

3.1.33.4 Screw driver of various sizes.

3.1.33.5 Philips driver.

3.1.33.6 Allen key set.

3.1.33.7 Wrench set.

3.1.33.8 Vice.

3.1.33.9 Drill m/c and drill bits.

3.1.33.10 Tweezer set.

3.1.33.11 Watch makers screw driver set.

3.1.33.12 Needle file set (jewellers' set)

3.1.33.13 Side cutting nippers.

3.1.33.14 Snappers of various types and sizes.

3.1.33.15 Spring loaded special screw drivers.

3.1.33.16 Hammers (ball and flat head type).

3.1.33.17 Washer remover.

3.1.33.18 Table lamps.

3.1.33.19 Immersion water heater.

3.1.33.20 Hot plats.

3.1.33.21 Porcelain bowl with bed.

3.1.33.22 Adhesives.

3.1.33.23 Anti-static mat, tray and wrist strap.

3.2 Equipment for Instrumentation Section

3.2.1 Pneumatic wing

a) Electro-pneumatic calibrator panel.

b) Handle operated pressure generator.

c) Over-pressure protection valve.

d) U-tube water and mercury manometer.

e) Precision master manometer.

f) Precision pressure guage of various ranges.

g) Standard size nipples, connectors and adapters of various types.

h) P / I convertors.

i) Pneumatic Positioners and control valves

3.2.2 Hydraulic Wing

3.2.2.1 Hydraulic system consisting of

a) Oil pump unit of 18 litres capacity 0-10 kg/cm^2 pressure with inlet and outlet pressure gauges, switch “ON” and “OFF” facility for pump and

b) Tool kit.

3.2.2.2 Fluidic kit system consisting of testing actuators and loads.

3.2.2.3 Interphase for linear movement for hydraulic system utilization.

3.2.2.4 Torque wrenches and screw drivers.

3.2.3 Temperature laboratory – It shall basically consist of thermostatically controlled bath area and measuring / data acquisition area. The equipments shall be basically:

a) Low / medium temperature calibration bath

b) High temperature calibration bath

c) Pyrometer testing stand

d) Thermocouple fusing and annealing station.

e) Precision mercury thermometer.

3.2.4 Other facilities

3.2.4.1 Portable Electro-pneumatic calibrator / simulator

3.2.4.2 Microprocessor based potentiometer / temperature calibrator.

3.2.4.3 Dead weight pressure guage tester without oil 0-300 kg/cm^2 range and 0.1 percent accuracy.

3.2.4.4 Environmental chamber with R.H. and temperature control up to 1400^{o}C.

3.2.4.5 Coil winding machines.

3.2.4.6 Standard test …….. test benches and equipment recommended by various manufacturers of instrumentation system as applicable to the particular plant.

3.3 Automation Section

3.3.1 Universal EPROM Programmer

3.3.2 U.N. EPROM eraser.

3.3.3 Logic comparator and current tracer.

3.3.4 Switch mode power supply (SMPS)

3.3.5 Logic analyzer

3.3.6 Signature analyzer

3.3.7 Programmable controller complete with engineering station

3.3.8 Data acquisition system

3.3.9 Personal Computer with Office Automation Tools Software

3.3.10 Recommended equipments and set up by various manufacturers for their automation system as applicable to the particular plant.

3.3.11 Calibration Management Sytem complete with PC & required Software . Different type of PLC'S with interfacing capabilities.

3.4 Training and Simulation Equipment

3.4.1 Load cell simulator

3.4.2 Thyristerized dc motor drive trainer and ac frequency motor drive trainer.

3.5 Equipment for Precision Workshop – Depending upon the volume of work, a precision mechanical workshop may be organized. The equipment for the workshop can be selected out of the following suggested items:

3.5.1 Drilling machine

3.5.2 Grinder – Double wheel with smooth and rough grinding facility

3.5.3 Watch maker's lathe with standard accessories.

3.5.4 Lathe machine

3.5.5 Small universal milling machine

3.5.6 Two plane surface plate

3.5.7 Hacksaw with blades

3.5.8 Powersaw with blades

3.5.9 Blower/ Hot Blower

3.5.10 Blow lamp

3.5.11 Lathe, tools, spanners, hammers, calipers, micrometers, verniers, screw pitch gauge, depth gauge, needle file, Allen keys, scissors, centre punch, small chisel, scappers, goggles, measuring tape, foot rule, screw drivers.

3.5.12 Tip and die set

3.5.13 Circlip plier set

3.5.14 Engineers wire and tread gauge

3.5.15 Precision hexagonal key and nut driver set

3.5.16 Adjustable multipurpose bench vice.

3.5.17 Contact cleaning and brushing tool

3.5.18 Dial gauge

3.5.19 Soldering iron

3.5.20 Set of watch makers tools with magnifying glasses

3.5.21 Oil stone for sharpening

4. Degree of accuracy of the equipment required is dependent on the category of equipment existing in the plant and hence may be decided on these parameters.

5. INFRASTRUCTURE AND OTHER FACILITIES

5.1 The suggested infrastructure and associated facilities are:

a) Independent work tables with suitable shelves, power sources (ac and dc) and measuring instrument facility.

b) Independent table with shelves, power source and measuring instrument facility

c) Built in fixed and flexible lights

d) Suitable anti-static work benches and allied anti-static equipments including anti-static mats should be provided for proper handling of static sensitive CMOS devices.

5.2 Air conditioned room for maintaining controlled environmental conditions.

5.3 Water supply

5.4 Emergency exit facility

5.5 Library to house data books, system manuals, various literatures and journals, etc.

5.6 Store room to keep spares, consumables, etc.

5.7 Regulated pneumatic air supply of instruments quality as per IPSS:2-07-018-88 `Air for pneumatic instruments'.

5.8 Earthing system shall be as per IS 3043:1987 `Code of practice for earthing (first revision)'.

5.9 Temperature and Humidity measuring facilities in laboratory room.

5.10 Magnifying Glass

5.11 Fire Extenguisher

5.12 Shock Treatment chart should be display.

6. Electronic components, consumables of different varieties may be arranged as per the requirement.

7. SUGGESTED DATA BOOKS AND LITERATURES

a) Data books for all electronic components including ICs from different manufacturers.

b) Handbook on process instrument and control.

c) Microprocessor data book / handbook of different manufacturers.

d) Master type locator book

e) Application notes / references of various manufacturers.

f) Statuary certificates for all test instruments with tracability.

g) Service Manual for all equipments.

h) Competency of Operator specific to weighbridge.